Implementing the five-a model of technical refinement

Routledge
Taylor & Francis Group

Journal of Applied Sport Psychology

ISSN: 1041-3200 (Print) 1533-1571 (Online) Journal homepage: https://www.tandfonline.com/loi/uasp20

Implementing the Five-A Model of Technical Refinement: Key Roles of the Sport Psychologist

Howie J. Carson & Dave Collins

To cite this article: Howie J. Carson & Dave Collins (2016) Implementing the Five-A Model of Technical Refinement: Key Roles of the Sport Psychologist, Journal of Applied Sport Psychology, 28:4, 392-409, DOI: 10.1080/10413200.2016.1162224

To link to this article: https://doi.org/10.1080/10413200.2016.1162224

Accepted author version posted online: 09 Mar 2016.
Published online: 06 May 2016.

JOURNAL OF APPLIED SPORT PSYCHOLOGY, 28: 392–409, 2016
Published with license by Taylor & Francis
ISSN: 1041-3200 print / 1533-1571 online
DOI: 10.1080/10413200.2016.1162224

Routledge
Taylor & Francis Group

Implementing the Five-A Model of Technical Refinement: Key Roles of the Sport Psychologist

HOWIE J. CARSON AND DAVE COLLINS

University of Central Lancashire

There is increasing evidence for the significant contribution provided by sport psychologists within applied coaching environments. However, this rarely considers their skills/knowledge being applied when refining athletes' already learned and well-established motor skills. Therefore, this article focuses on how a sport psychologist might assist a coach and athlete to implement long-term permanent and pressure proof refinements. It highlights key contributions at each stage of the Five-A model—designed to deliver these important outcomes—providing both psychomotor and psychosocial input to the support delivery. By employing these recommendations, sport psychologists can make multiple positive contributions to completion of this challenging task.

Despite still existing barriers to applying sport psychology within coaching environments (Newman, 2015; Ravizza, 1988; Weaver, 2014; Winter & Collins, 2015), growing evidence has demonstrated the positive contribution that the field can offer toward achieving enhanced levels of skill learning and performance through a focus on technical issues (e.g., Collins, Doherty, & Talbot, 1993; Hodge & Smith, 2014; Seabourne, Weinberg, Jackson, & Suinn, 1985). It is important to note, however, that if sport psychologists are to make further in-roads within coaching environments, the field must be able to demonstrate even greater expertise in situations relating to the development of an athlete's movement technique (e.g., Mendoza & Schöllhorn, 1993; Penn & Spratford, 2011; Ranson, King, Burnett, Worthington, & Shine, 2009). One specific and important instance of this contribution, are situations in which an athlete's already learned and well-established technique (Carson & Collins, 2016) is in need of *refinement*, a small tweak or polish rather than the learning of a completely new movement (see Carson & Collins, 2011). Contrary to the predominant focus within applied case studies that have been published in this area to date (e.g., Carson, Collins, & Jones, 2014; Collins, Morriss, & Trower, 1999; Hanin, Malvela, & Hanina, 2004), such changes are not unique to elite- or international-level athletes. Rather, the issues we address in this article are prevalent at all stages of a performance pathway once a skill has been *learned* (Gentile, 1972), even though exemplar practice is scarcely (if ever) reported on, at least from an evidence-based/scientific perspective. For example, refinement scenarios might involve a youth county cricket bowler refining their wrist action for greater ball spin, a recreational 17-handicap adult golfer trying to increase their weight shift during the downswing to generate higher clubhead speed, or a

Received 26 October 2015; accepted 8 February 2016.

Address correspondence to Howie J. Carson, Institute for Coaching and Performance, University of Central Lancashire, Preston, PR1 2HE, UK. E-mail: HCarson1@uclan.ac.uk

Division 3 slalom kayaker working to open their angle of attack to pass through an upstream gate. Although performance outcome is different between these and elite athletes, refinement (as opposed to skill acquisition) procedures are applicable based on the consistency of motoric control (i.e., movement automaticity, for better or worse!) and when the athlete possesses high commitment to improve. In fact, irrespective of level (at least as shown by research to date), the more experienced and overlearned the execution is with the athlete, the more difficult it will be to change. As such, knowledge pertaining to this specific topic should be of interest to those sport psychologists operating with a "performance" agenda irrespective of an athlete's skill level (as opposed to sport psychologists operating with a focus on mental well-being or lifestyle management).

Notably in this regard, a recent study suggests that experienced applied sport psychologists are rarely utilized by coaches when implementing technical developments (Winter & Collins, 2015). Indeed, Winter and Collins reported these practitioners to question their own level of competency when advising coaches on this issue, resulting from a lack of mechanistic clarity due (they stated) to limitations in training and education. Accordingly, further education on this topic, to increase and/or contextualize necessary knowledge and confidence in applying such expertise, seems to be an essential precursor for more comprehensive and effective sport psychology provision.

Crucial for the refinement of well-established motor skills, as this article aims to demonstrate, the contribution of resources offered by a sport psychologist is essential to ensuring an optimum intervention effect, particularly when refinements require long-term permanence and resistance against the negative impact of anxiety (e.g., Carson & Collins, 2011, 2014). Accordingly, this article focuses on the optimal implementation of the interdisciplinary Five-A model, which is designed to bring about such change to already learned and well-established skills (see Carson & Collins, 2011, 2014, for details pertaining to the derivation of each of the five stages). In pursuing this overarching aim, we address the underpinning purposes, mechanisms, and applied (direct and indirect) practices at each of the five stages, with particular reference to those aspects where a sport psychologist can operate to optimize the desired effects (for an overview of the Five-A model's structure and suggested applied practices, see Table 1). Acknowledging the broad interests of psychologists to understand the human condition (e.g., Ajzen, 1991; Holmes & Collins, 2001), we touch upon aspects of psychology that are both psychomotor and psychosocial in nature. In addition, to assist practitioners in contextualizing the stages presented, we provide real-life examples and practices reported within empirical research from a range of closed skill sports, as reflecting the current emphasis within the literature. Due to our not being able to address every sport within this article, practitioners must consider how such guidance might apply within their specific context, that is, applying "contextual intelligence" to practice (Winter & Collins, 2015, p. 41). Following, however, we aim to advance current understanding of the Five-A model through its impact other than with closed and self-paced skills. Accordingly, pertinent issues are discussed within open skill and team sport environments, with several directions for future research identified. Finally, as we demonstrate, the effective practitioner will have proactively built a base of skills and behaviors in his or her client that can facilitate every stage of the process *before* such change is even contemplated!

STAGE 1: ANALYSIS

Aim 1: Identify Athlete Requirements

Consistent with what we suggest should be standard professional practice, the optimal diagnosis and planning for *potential* intervention requires a detailed and considered period

Table 1
Overview of the Five-A Model and Suggested Applied Practices

Stage	Purpose	Direct coaching practices	Indirect coaching practices
Analysis	• Identify athlete requirements • Ensure athlete intention to change	• Structured use of performance analysis to provide the evidence • Athlete perceptions are also key. Carefully consider alternatives which they might offer • Ideas need to fit within athlete's existing structures and systems unless drastic change is needed. In this case, it will take longer	• Use of performance videos, evaluations of competitors, etc. • Generate "group" structures such as DNA or brands, trademarks, etc. • Enough discussion to convince. Not so much as to cajole!
Awareness	• Deautomate the erroneous (well-established) technique	• Contrast training • Right/Left repetitions • Training with primes and reminders	• Use of role models, live or video, who exhibit new technique • Questioning to focus attention on contrasts
Adjustment	• Modify the erroneous technique	• Leave the athlete to it as much as possible • Let the athlete solve problems • Essential to change cues as new version becomes more embedded	• Use of self-video, with "best attempt" as model • Include scoring and video to demonstrate progress
(Re)Automation	• Internalize the change to subconscious control	• Automation is unconscious, so leave them to it but keep watching • Use of holistic cues (e.g., rhythm and/or mood words)	• As above and sell progress to the athlete • Mental simulation of movement is crucial, but done in context
Assurance	• Increase confidence in automaticity during high-pressure conditions	• Lots of positive challenge and pressure work • Competition simulations—make sure that new skills are correctly contextualized	• New game plans incorporating a variety of challenges (e.g., weapons in martial arts) • Leave a sufficient gap before next change (i.e., periodization)

of ideally evidence-based analysis. According to Carson and Collins (2011), this represents a time to consider "the need for and direction of change" (p. 149). Crucially, exploring alternative factors must also be included when constructing a case formulation (Martindale & Collins, 2005). As sport psychologists are well aware, suboptimal performance is not necessarily rooted in consistent technical errors (e.g., Cresswell & Eklund, 2006; Wanlin, Hrycaiko, Martin, & Mahon, 1997), nor do circumstances always permit the time required to implement technical refinements with long-term permanence and pressure resistance, a process that may take up to 12 months depending on the complexity of the sport (e.g., number of different skills required by the athlete, such as the singular skill of long jumping vs.

the multiskills utilized in golf) and the change (i.e., the extent of difference to the athlete's already established technique). Unfortunately, however, *some* athletes and coaches may be too quick to reach a decision in favor of refinement, perhaps viewing this option as the answer to simply suboptimal performance or unorthodox technical style (Carson, 2014). Therefore, this analysis process, including a weighing of pros and cons relating to various options generated, is something that the sport psychologist can promote in an effort to initiate a highly professional and structured approach (e.g., Martindale & Collins, 2012). In fact, effective working practice for psychology support will be to develop such a critical approach, promoting regular performance review processes as the norm for both athlete and coach. Of course, optimum timing of such reflective processes is all, but failure to review and make uncomfortable decisions can be equally as debilitating to performance as the more commonly acknowledged "paralysis by analysis" phenomenon, which may occur through overfrequent review (see Burke, 2011).

So, assuming that such attitudes and procedures are in place, and drawing on Prochaska and DiClemente's (1992; see also Prochaska, DiClemente, & Norcross, 1992) transtheoretical model of behavior change, a complete analysis must commence within the *precontemplation stage* (when the athlete neither perceives a need to change nor attempts to change anything) and then progress into the *contemplation stage* (when the athlete considers a possible change). Crucially, an athlete attending to a perceived fault or, worse still, switching between several such issues (whether real or imagined) can often result in a misrepresentation of individually optimal performance processes and outcomes. For example, a golfer choosing to change their set of golf clubs or attempting to self-correct their swing by focusing on different technical aspects ("I think I'm supposed to be doing this . . . or this . . . or this") *during* a 6-week analysis period have proven to be definite barriers to our conducting an analysis in the past. Indeed, practitioners across sports will recognize the almost frantic and wide-ranging search for solutions that are all too common in a frustrated athlete intent on improvement.

Ideally, therefore, the sport psychologist may wish to raise this issue with the coach and recommend ongoing monitoring during times of optimal performance, presumably when athletes are deterred from refining their technique and best performance(s) can be observed. This situation is most *likely* during the competitive season, at least for amateur athletes, when participation is probably at its peak. Concurrently, support practitioners (including the sport psychologist) must start to consider the types of interdisciplinary systems, resources, and schedules that might be necessary for successful future intervention if or when technical refinement is warranted.

Once an athlete is not aiming for immediate performance but, rather, is contemplating change, the sport psychologist should involve that athlete in self-reflective practices to understand the perceptions against, and in addition to, various lines of inquiry. Of importance, athletes must want to change, and understand the positive rationale (Deci & Ryan, 1985) that, considering the direct personal interest to improve their performance situation, would be unlikely to prove problematic. As a contrast to this case, however, consider the recent example of cricket batsman Gary Ballance; the following statement suggests that he may be (indeed should be?) an unsuitable candidate for change based on his level of "buy in" to the task alone (potentially with very good reason, although we cannot know for certain):

> When I was scoring runs, people were saying, "that's a good technique." . . . Suddenly, after two or three bad games for England, my technique is wrong, so I've just got to deal with that. . . . A lot of people are telling me I need to change, but what I've had, and what I've got now, is how I've got to playing for England in the first place. . . . My whole career, it's how I've made

> runs, and I don't think a few bad games should suddenly change things, so I'm not changing anything. (DailyMail, 2015)

Notably, motivation to refine technique may be more obvious when incorporated within a larger scheme of performance improvement, or branding (e.g., a nutritional, technical, and lifestyle package), and therefore requiring a much emphasized level of commitment—for example, Michael Phelps's decision to undertake fitness, nutritional, and technical changes to become more of a sprint swimmer as part of a new and personal challenge (Andersson, 2009; Palmer, 2009). Likewise, javelin thrower Steve Backley highlighted the need for "reinvention" following each season just to stay interested and prevent boredom (BBC, 2007). Before implementing change, such discussion with an athlete is likely to be exploratory in nature and could utilize principles of performance profiling (Butler & Hardy, 1992; Weston, Greenlees, & Thelwell, 2013) to understand the problem in its entirety. It should be noted, however, that effective profiling (at least as presented within the literature) relies on the athlete possessing an *accurate* conceptualization of his or her performance and its underpinning factors. As such, increased perceived autonomy (from a collectivist as opposed to independent perspective; see Ryan & Deci, 2000) and competence in realizing a solution to their performance needs may require the coach and sport psychologist to subtly guide and structure the interaction(s), which also reinforces a sense of relatedness. Thus, and of note, a client's profiling *inaccuracies* may be an important and useful feature of setting up for change. In short, triangulation of client perceptions with other sources of data can highlight the need for change.

In any case, exploring the use of pertinent psychological characteristics would clearly form a significant focus for the sport psychologist during this initial stage. For example, poor coping strategies during high-anxiety situations (Bortoli, Bertollo, Hanin, & Robazza, 2012) could, in turn, negatively influence technique (Collins, Jones, Fairweather, Doolan, & Priestley, 2001). In such cases, exploiting already existing levels of automaticity to better establish the skill under anxiety conditions (Carson & Collins, 2016), as opposed to refining technique, might be a more appropriate solution (see Schack & Bar-Eli, 2007). Of course, it is entirely possible that *several* interrelated factors may act to mediate suboptimal performance (e.g., Nieuwenhuys & Oudejans, 2012), so focusing on the demonstrably important (i.e., causative as opposed to associated) contributor(s) are essential. Furthermore, depending on the presenting circumstances (e.g., time relative to a competitive season, availability of resources), short-term trade-off decisions that provide immediate relief may be more appropriate, retaining the intention of conducting more extensive work later on. Notably, this process of thinking is supportive of the Professional Judgment and Decision Making (PJDM) approach (Abraham & Collins, 2011; Martindale & Collins, 2005, 2013), which should be employed by both coach and psychologist. In short, addressing the all-important "Why?" and "Why not?" questions must accommodate the existing, and inherently dynamic, sporting context.

Maintaining an individualized perspective, and returning to the latter *contemplation* phase within the analysis stage, listening to the athletes' perceptions regarding their own progress and considering areas for improvement, is a necessity for promoting a sense of autonomy (Deci & Ryan, 1985). However, such discussions can be a sensitive issue for some athletes, given the range of biopsychosocial factors that contribute toward performance (e.g., personal relationships outside of sport or fear from a previous injury). Accordingly, the interpersonal skills possessed by a professional sport psychologist, and ability to create a safe, confidential, and trustworthy environment, should mean that they are well equipped to help an athlete complete this reflective activity. Although we discuss the role of athlete *intention* to change in the following subsection, the notion of a shared understanding toward the problem, an overarching performance goal, and resultant decision to intervene can help to develop essential trust and

confidence among an athlete, coach, and support practitioners (Ajzen, 1991). In unfortunate cases of refining injurious technique during return from injury (see Carson et al., 2014, for a detailed case study approach), the sport psychologist can also have a significant impact on the psychological rehabilitation and development of confidence prior to physical manipulations. For example, in the case study of an injured judo player (ruptured anterior cruciate ligament) reported by Martindale and Collins (2012), a preliminary stage of "grief and coping" saw the sport psychologist help with the distress of having to withdraw from major competitions by providing comfort and emotional support. Furthermore, the sport psychologist worked with the athlete to find a rational perspective toward the current situation moving forward. Motivation was then channeled toward rehabilitation by collaboratively compiling video footage of best performances, which also assisted with imagery practice for skill development. The idea that a sport psychologist should play an educative as well as supportive role prior to intervening is not uncommon within the sport psychology literature (e.g., Lynch, 1988) and would also seem appropriate at this stage.

Aim 2: Ensure Athlete Intention to Change

Notably, attention to the details just examined may also enhance psychosocial aspects of the refinement process by fostering empowerment and *intention* to implement change. Drawing on the theory of planned behavior (Ajzen, 1991), intention can be considered the immediate antecedent to planned human behavior. As a basic relationship, the stronger the intention to perform a behavior, the more likely it is to be attempted. Intention is guided by the aggregate of three determinants that, we suggest, sport psychologists consider in conjunction with the coach and their specific practice context. The first is *attitude* toward the behavior, whether or not performing the targeted behavior is perceived with high expectancy to improve a situation. The second determinant is the *subjective norm*, referring to the perceived social pressure to perform a specific behavior. In practical terms, whether important individuals within a group believe that a potential change would be beneficial or deleterious toward performance, that is, competence-supporting behavior. In addressing these two factors, use of performance analysis (see Polkinghorne, 2015, on how the Australian Institute of Sport is using 3D motion capture technology with athlete Kelsey-Lee Roberts) or more qualitative forms of self-observation (e.g., video replay of performance) as a considered evidence base, may help "sell" an idea and/or intervention design to the athlete (Collins, Carson, & Cruickshank, 2015), especially if this is coherent with broader environmental changes apparent, as discussed in the earlier examples of Michael Phelps and Steve Backley, or perhaps in situations when an athlete needs to adapt to new equipment regulations (e.g., as witnessed in alpine skiing and ski jumping; Müller & Schwameder, 2003).

The final determinant, *perceived behavioral control*, is the relative ease with which athletes believe they can execute the targeted behavior, this factor being associated with (but independent of) its actual control. As such, acknowledging these three determinants within the Analysis stage indicates a strong need for an empowered athlete with sufficient understanding of *why* change is necessary, *what* to change, and *how* to change (Prochaska & Prochaska, 1999). Given that a technical refinement is, by definition, something new to an athlete, it might be advantageous to focus on attitude and subjective norm determinants initially to increase the level of intention. A greater level of buy in and acceptance of progression during the Analysis stage may buffer against potential dropout in what is likely to be a disruptive and difficult experience as performance dips (as shown in Figure 1).

In supporting other colleagues to create a consistent subjective norm, the sport psychologist can assist the coach (and other support practitioners) in addressing any potential concerns

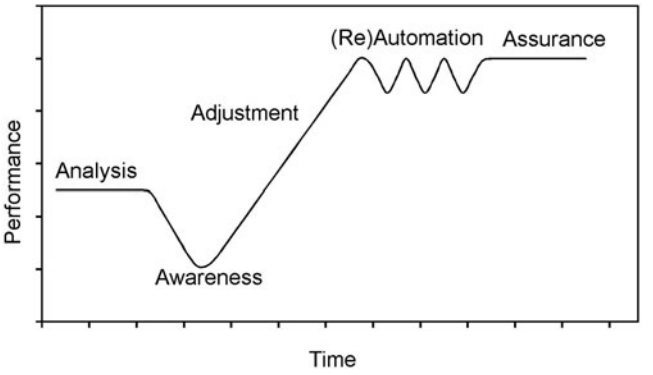

Figure 1. Performance impact of each stage within the Five-A model.

pertaining to their proposed intervention delivery (e.g., how to implement attentional control strategies, how to react to various eventualities, and how this may influence an athlete's performance or intention), or act to strengthen the coach–athlete relationship (Harwood & Steptoe, 2013). In their review, Giges, Petitpas, and Vernaccia (2004) identified coaching as being highly stressful but largely neglected by sport psychologists to date. As such, it was suggested that assistance could be offered to coaches relating to time, stress, and media management through increasing self-awareness of their own actions. The general purpose proposed by Giges et al. is to address issues of self-doubt, low self-confidence, excessive or misplaced perfectionism, behavioral impulsiveness, and poor communication. In the case of implementing refinements, previous attempts at refining athletes' technique could be discussed during in-house, roundtable meetings to avoid slipping into common, but ineffective, coaching habits (e.g., practices designed for skill acquisition). Because it is reported that elite-level athletes perceive coaching behaviors and preparation as a primary source of confidence (Hays, Maynard, Thomas, & Bawden, 2007), the coach–athlete–psychologist relationship is clearly a vital component to succeeding during times of development that require a significant mental component. Responsibility and trust transferred to athletes can be empowering when they know that there is a high level of support (Becker, 2009). In short, the athlete–coach–psychologist relationship is transformative and not entirely top-down. Likewise, it is important for the sport psychologist to ensure coach co-operation before commencing with any intervention, as highlighted by Beauchamp, Harvey, and Beauchamp (2012). We suggest that generating a shared mental model, that is, "knowledge structure(s) held by each member of a team that enables them to form accurate explanations and expectations . . . and in turn, to coordinate their actions and adapt their behavior to demands of the task and other team members" (Cannon-Bowers, Salas, & Converse, 1993, p. 228), is therefore essential to the team's (i.e., athlete and interdisciplinary support team) success (Carson, Collins, & Kearney, in press). Accordingly, sport psychologists must understand the sport's social and cultural milieu, and previous experiences of the athlete, in order to work toward identifying realistic goals, prioritizing and respecting those as being specific to each individual.

STAGE 2: AWARENESS

Aim: Deautomate the Erroneous (Well-Established) Technique

To deautomate the aspect of technique requiring refinement (hereafter termed the *target variable*), athletes are required to *consciously* apply a narrow and internal focus of attention (cf.

Wulf, 2013), which enables access to the relevant movement component within the memory trace (Christina & Corcos, 1988). If control over the target variable remained largely subconscious, as is thought ideal for *performance* (Csikszentmihalyi, 1990; Swann, Crust, Keegan, Piggott, & Hemmings, 2015), it would be difficult to see how any long-term changes could be initiated. Indeed, Rendell, Farrow, Masters, and Plummer (2011) have demonstrated the limitations of implicit strategies in this particular context. More specifically, athletes counting the number of tones overlaid on music soundtracks (i.e., an effort *not* to think about the movement) during netball shooting practice to a higher than regulation ring led to an eventual lower ball flight trajectory instead of an intended higher trajectory, despite athletes not being aware of any change taking place. In short, a conscious focus seems to be an essential precursor of effective motoric change.

This stage is also when the consequences of deciding to change begin to bite. As a first step, consider the outcomes of the process against performance, which are presented diagrammatically in Figure 1. Following the decision that change is necessary, there will be an inevitable drop in performance as the process commences. For those athletes who continue to compete at this stage, there may also be a drop in outcome, depending on the standard of the opposition, of course! So in golf this might be a worse tournament ranking/failure to make the halfway cut, or in tennis as a drop in tournament progression based on fewer head-to-head wins. In either case, an underlying cause is due to the disruption of automaticity and, therefore, motor control processes (e.g., power, velocity, balance, position, and timing). This can be very dispiriting for the athlete, even if she or he has been well primed, so both coach and psychologist must work in tandem to ensure that motivation does not drop through a strong, but notably redirected, emphasis on process-oriented goals pertaining to the technique modification.

Crucially, athletes must understand the purpose of this stage and be able to realistically adapt their expectations. For some athletes (or some changes), there may be long-term merit in withdrawing from competition at this point, for instance, depending on the security of their current ranking (e.g., already achieved exemption to certain events), or the low status of upcoming competitions. Indeed, this is one of several risky periods in the Five-A model process in that, once the technique has been deautomated, it is almost as hard to go back as it is to complete the change. Many performers have been caught in this approach–avoidance trap, so care is needed. Consider the case of golfer Craig Perks, who, following a win at The Players Championship in 2002, failed to secure his playing rights on the PGA Tour due to an attempted refinement to his wrist position (Verdi, 2012). In short, Perks could not progress beyond the Awareness stage during competition, leading to a rapid decline in prize money, exemptions, and invitations to compete.

To achieve this essential deautomation effect, applied literature has positively demonstrated the employment of *contrast* drills (see Carson et al., 2014; Collins et al., 1999; Hanin et al., 2004). These drills consist of an alternating practice schedule between the already existing (old/incorrect) "comfortable" technique and desired (new/correct) but, as yet, "uncomfortable" version. To emphasize the starkness of this process, Carson and Collins (2011) described it as driving a "wedge" (p. 152) between the two movement patterns to initiate the refinement process.

Contrast drills challenge athletes for two main reasons. First, a movement component that has been under largely subconscious control must return to consciousness (i.e., executing an already existing technique under a different type of control); second, athletes must consciously manipulate their movement to achieve a new technique. As such, executions are performed with an imbalance of control and require a high degree of concentration and motivation. Using paradoxical training interventions (i.e., asking an athlete to purposefully make an error;

see Bar-Eli, 1991) as one way to explain the intended outcome (see also Carson, Collins, & Richards, 2016), contrasts between techniques enable the coach to "reframe" the situation and the athlete to *realize* what is required to make the change, that is, to fully notice the difference. To facilitate this high level of mental challenge, Collins et al. (1999) employed contrasts between left- and right-handed, in addition to correct and incorrect, javelin throws to force the athlete's conscious awareness. In another example, Carson et al. (2014) reported a case study of a weightlifter refining the snatch technique. Specifically, kinesthetic discrimination was generated by firstly manipulating a broomstick handle, and then a progressively heavier bar, to a much straighter (i.e., in-line shoulder, elbow, and wrist alignment) receive position. Such training, and the potential removal of external environmental information (e.g., hitting a golf or cricket ball into a net) in order to further enhance attention toward the contrast (see Carson et al., 2016; Hanin, Korjus, Jouste, & Baxter, 2002), serves to heighten the athlete's acuity/awareness (cf. Giblin, Farrow, Reid, Ball, & Abernethy, 2015), although it is notably unrepresentative of actual competitive scenarios (cf. Renshaw, Davids, Shuttleworth, & Chow, 2009). Moreover, these training practices prevent an overreliance on generating incorrect movement through the use of exaggeration to notice the difference (e.g., asking a tennis player to "overflex your knees as you transfer your weight during the service backswing").

Concomitantly, retrieval and manipulation of the motor memory trace can be optimized through focused use of mental imagery as a specific prime while performing these drills. Referring back to the role of perceived behavioral control (Ajzen, 1991), it is at this moment where intention to progress with the refinement may be reduced due to the inherent difficulty and *inexperience* with these executions: Even a small change can feel like a major disruption when skills are established to a high degree, *irrespective of the athlete's skill level*. Accordingly, sport psychologists can work alongside a coach to identify individuals who have a strong positive connection with the athlete, an ability to perform the desired skill (or close to it), and therefore provide a meaningful but appropriately challenging imagery stimulus (Holmes & Collins, 2001) through either live or video observations, in essence offering athletes a useful target conceptualization to inform their own self-imagery and subsequent use of a self-model. For instance, consider the powerful impact that Lewis Hamilton (2015) reported his hero Ayrton Senna had on his performance:

> A lot of the way I drive today is inspired by the way I saw him drive. . . . He had the rare quality of greatness. Even now, you can still learn things from how he approached racing and how he drove.

Furthermore, when observing such demonstrations, we recommend that athletes employ internal kinesthetic imagery (i.e., "This is how it would feel if I were executing that technique") to increase the number of retrieval cues within the nonverbal memory coding system (Holmes & Calmals, 2011; Paivio, 1986). Indeed, despite the outcome of technical refinement being predominantly thought of as kinematic in nature, from the athlete's perspective this can be achieved only by generating and discriminating between kinetic differences. Ensuring that kinetic cues correspond with desirable kinematics is, however, crucial and a useful step to reassuring the athlete (through video analysis) that what undoubtedly feels awkward is, in fact, only a small tweak. Therefore, questioning athletes (e.g., "how did that execution feel? Any different?") in order to expose their thinking following contrasts and receiving verification from the coach regarding technical accuracy are essential communicative aspects of the coaching process.

STAGE 3: ADJUSTMENT

Aim: Modify the Erroneous Technique

Characteristically within this stage, the athlete becomes more familiar with the target variable kinematics, and anything that the support team can do to facilitate this will help the overall process. For example, Carson and Collins (2015) used an Apple iPad to show a golfer their ever-improving best attempt swing during training while requiring the use of kinesthetic imagery. The fact that the athlete is watching themselves first increases the level of personal meaning and motivation (because the movement is directly related to *their* performance) and second, serves to modify the memory trace through recoding of stimulus and response propositions. Response training (Lang, Kozak, Miller, Levin, & McLean Jr, 1980) is particularly useful at this stage, providing another element that the psychologist can address. During this process, the psychologist reinforces particular aspects of the imagery content as reported by the athlete, again through careful use of questioning and primes. After consultation with the coach—who will likely be more experienced with the physical execution, able to empathize with the athlete's experience and verify reporting of response propositions—feedback can be provided to help progressively *shape* the movement toward a desired end goal with reference to kinematic evidence collected. With increasing practice and familiarity, athletes are expected to demonstrate greater accuracy and comfort with the new target variable kinematics while departing from a preference for the original version (i.e., "That old version now feels strange").

Once again, contrast training with old versions being gradually faded out will characterize this stage. So, whereas in the Awareness stage the number of old (or incorrect) version attempts was similarly matched by the number of new (correct) versions, here the balance starts to move more toward predominantly executing with the intended new version. The goal of providing a clear and understood set of movements can also be facilitated by focusing on the declarative detail of what is needed and how it is different (see Carson et al., 2014). Crucially, as the athlete becomes more familiar with the movement goal, primes must be adapted to best suit current perceptions. It has yet to be investigated, but we feel that attempts to *unconsciously* shape the new behavior, through solely implicit, constraints-based coaching, for example, are less likely to generate effective outcomes such as long-term permanency and robustness under stressful conditions. This may well necessitate a change of behavior by the coach if they are devoutly convinced by this approach, and the psychologist can help greatly by supporting the necessary approach.

STAGE 4: (RE)AUTOMATION

Aim: Internalize the Change to Subconscious Control

In this stage, great benefit can be made from "layering" (e.g., Williams, Cooley, & Cumming, 2013) holistic, rhythm-based sources of information (MacPherson, Collins, & Obhi, 2009) into mental imagery use as the athlete completes the placement of the technique firmly to automatic control. According to MacPherson et al. (2009) continued use of part skill "cues" would be detrimental under conditions of competitive stress because the movement remains fragmented, therefore disrupting the necessary flow and timing of the entire skill. Exemplar cognitions have included a focus on the rhythm of the movement and optimal arousal/emotion required (cf. Holmes & Collins, 2001). Collins et al. (1999) overlaid a series of bleeps at every foot—ground contact onto real-time video footage for a javelin thrower to direct their attention away from the target variable. Volume, pitch, and timing were emphasized to inform the athlete about

changes in the technical phases (i.e., straight run, sideways turn, planting the "block" leg, and throw), as perceived by the athlete themself, thus providing a fluid stimulus and a continuous stream of information. Indeed, Collins (2011) explained the need for independent athletes (e.g., bobsled, dressage, swimming, and archery) to internalize their own "pace notes" (p. 384) in the absence of a copilot (quite literally in the sport of rally driving!). In fact, these "notes" (primes) are often consulted as part of the pre-execution routine and particularly visible through the behavior of some athletes (e.g., rugby penalty kicker Neil Jenkins; see Jackson & Baker, 2001). As such, the sport psychologist may usefully note various behavioral features of the skill execution to provide useful (although not guaranteed) clues about the athlete's level of comfort and internalization.

To help stimulate an effective holistic focus, mood words (e.g., *thump, bang, flush, clip, swish*) can also provide the athlete with a beneficial "aide memoire" of the whole movement (Rushall, 1979), so long as it accurately corresponds with important movement capacities such as the required strength, speed, power, agility, balance, or endurance (Mullen & Hardy, 2010). As such, the generation, experimentation, and selection of these words may be suitably guided during discussion and video review of successful executions with the sport psychologist. Whether explicitly focusing on the actual timing/rhythm or doing so via mood words, such thoughts are suggested to provide a "prophylactic against potentially disruptive cognitions and emotional states that inhibit fluid movement" (MacPherson et al., 2009, p. S58) such as worrying thoughts brought about by internal (e.g., elevated heart rate) or external (e.g., pressure from an opponent) distraction *and* as creating a most direct route to retrieval of the entire skill from memory (see also Winter, MacPherson, & Collins, 2014). Therefore, it is important to complete this process in a representative context to allow the new version technique to regain essential levels of functional variability (Carson, Collins, & Richards, 2014a) and encourage increased attention toward important task-relevant information (e.g., decision making processes). Without this, the change will always be susceptible to pressure, with the athlete succumbing to regression to the old, well-established version at the most inconvenient moment, usually a major championship or final! Maintaining confidence in the process, enabling the performer to "let go" of conscious control (Moore & Stevenson, 1991), is an important aim for coach and psychologist at this stage (see Carson & Collins, 2016). Once again, a double act between the two can be very effective.

In addition, because this stage is characterized by a more "hands-off" approach, it is important to monitor athletes and listen carefully to their feedback. The process should be one of increasing independence and spiraling confidence. As the resident emotion expert, the psychologist can monitor progress with a different impact of the coach; inquiry by one can be tangential interest, questions by the other often generate anxiety and a more conscious (and often detrimentally part skill; MacPherson, Collins, & Morriss, 2008) focus. In short, implicit response demands and consequent impression management (James & Collins, 1997; Leary, 1995) can cause regression, so the coach (as the technical expert) will often sensibly step back into a covert monitoring role at this stage. Once again, the sensible practitioner will have laid the ground for these differing roles through setting the parameters and expectations of service support a priori (Carson et al., in press).

STAGE 5: ASSURANCE

Aim: Increase Confidence in Automaticity During High-Pressure Conditions

As suggested by the preceding aim, complete confidence in the automatic skill execution (Carson & Collins, 2016) and its efficacy in all weathers is essential. As intimated throughout this article, a failure to effectively "close the lid" on technical change, with consequent failure

under pressure (e.g., golfers Tiger Woods, Padraig Harrington, and Craig Perks), is the most common cause of breakdown for such processes. Therefore, there is almost never too much that can be done to demonstrate and reassure the athlete (and often the coach) that all is well with the change now embedded successfully.

Applied research shows that a variety of challenges, including physical fatigue (Collins et al., 1999) and high levels of social evaluation (Carson et al., 2014), can be used to generate pressure against which the skill can be tested and, pending successful outcomes, reassurance provided. According to Bortoli et al. (2012) this desirable performance state (termed "Type 1") is also dependent on positive emotional regulation. As such, competitive simulations with prior strategic planning provide an opportunity to test and develop appropriate strategies for handling high-anxiety symptoms and ensure that performance is maintained (see H. Richards, 2011)—for example, performing line-out throws with bouts of 150-m sprints and upper body weight lifts in between while being video recorded, watched, and evaluated by coaching staff. Notably, the phasing and micro- or meso-periodization of this can be a delicate process, so once again, strong collaboration between coach, athlete, and psychologist can be very useful in driving the process to an optimum conclusion. The major outcomes here are shown through improvements in both actual performance (especially consistency) and perceived proficiency, so the double act between coach and psychologist is clearly relevant.

PRACTICAL CONSIDERATIONS AND IMPLICATIONS

Having outlined the Five-A model's structure and suggested important practices that may be contributed by the sport psychologist, there are several considerations that require further discussion. Of course, the methods just described can be effectively applied to all closed skills that occur in the more open team sport environment. Thus, penalty/place kicking, throw-ins, penalty flicks, and free throws are all suitable for application of the Five-A model. Less clear (and therefore a current research project of ourselves) is how much of the model can be applied to individual player and/or unit refinements. For example, the development of a more attacking style, taking certain options, or even adjustments for specific opponents may all benefit from considering change through a stage model such as the Five-A approach (cf. P. Richards, Collins, & Mascarenhas, 2012; P. Richards, Mascarenhas, & Collins, 2009). In similar fashion, the reshaping of a player's style as she or he moves to a new team system will usefully incorporate many of the processes just described, albeit that the time pressures inherent in professional sport require a rather faster turnaround. In short, although evidence for the efficacy of the approach is collected, we would strongly suggest a consideration of the Five-A principles in the open skill setting of refining style.

Such considerations, therefore, suggest a number of necessary implications for further research to understand the Five-A model from the perspectives of different stakeholders involved in making the refinement (e.g., interdisciplinary team members, athlete, coach, etc.). For example, and similarly to Prochaska and colleagues' study to understand addictive behavior change (e.g., Prochaska & DiClemente, 1983; Prochaska, Velicer, Guadagnoli, Rossi, & DiClemente, 1991), qualitative interviews and/or surveys might seek to expose the key factors at different moments during the refinement process as an empirical test of the Five-A model's veracity in the applied context.

From a professional training and development perspective, it would be useful to identify stages of the model within applied contexts to understand *how* and *why* sport psychologists practice if/when they *do* work with athletes to implement refinements. Some of these elements have been explored with high-level golf coaches and players (Carson, Collins, & MacNamara,

2013); however, we have scarce, if any, detailed knowledge about applied sport psychology in this situation. In addition, it is necessary to test applied sport psychologists' interpretation of the Five-A model at macro- (i.e., how refinement fits within an athlete's broader training agenda), meso- (i.e., the nature of the process per se), and micro- (i.e., stage/session requirements) levels. Establishing a representative picture of current knowledge/practice is clearly required before any specific recommendations can be offered on how best to address training and development at this stage, that is, without discounting the need for multiple formal and informal approaches across the career development pathway (Stoszkowski & Collins, 2016).

More generally, however, we provide what we would consider to be two essential factors to progress. First, there is a distinct need for sport psychology and motor control knowledge to be reconsidered in unison. Unfortunately, in our view, this separation has been driven by too narrow a focus in each case—emotion and cognition in the former and co-ordination dynamics in the latter. Bridging this gap, recent efforts have been made to examine the effects cognition over elements of the movement execution. Carson and Collins (2014, 2015) recently termed this study "psychomechanics" and have explored relative states of automaticity through use of intraindividual movement variability as an indicator of such control (e.g., when executing golf shots with a ball or as intentional practice swings; Carson, Collins, & Richards, 2014b). In short, planned training designs must address not only the development of task-specific cognitive strategies but also *how* the execution may be embedded with relative permanence and pressure resistance (cf. Carson & Collins, 2016).

Second, and as already introduced earlier, the deployment of a PJDM approach toward developing *expertise* (Collins, Burke, Martindale, & Cruickshank, 2015) in this area would appear to offer a most plausible solution. In contrast to a competency-based approach, whereby good practice is perceived to consist of a predetermined (and narrow) set of elements, a PJDM approach would require the utilization of knowledge to resolve practical problems, in other words, to generate possible options for action and then to evaluate those against the individual athlete's goals and presenting circumstances (Martindale & Collins, 2005). Within this largely cognitive exercise, there would inevitably be a high demand for questioning and (potential) challenge toward existing ideas about practice and how to integrate with other support practitioners. Therefore, it is important that practitioners possess an open-minded and willing attitude to accept and reflect upon positive criticism (Collins, Abraham, & Collins, 2012).

CONCLUSION

This article has demonstrated the significant contribution that sport psychologists can offer to athletes and coaches when attempting to refine already well-established motor skills. Notably, we explained how this is characterized by a diverse range of tasks across organizational, analytical, social, and performance aspects of the Five-A model. Ultimately, however, optimization of provision relies on the support team's interdisciplinary strategy and an underpinning expression of trust, shared expertise, and desire for positive collaborative outcomes. Therefore, increasing use of discipline experts in interdisciplinary teams (e.g., sport psychologists and biomechanists) within applied coaching environments necessitates a degree of cross-disciplinary understanding from all "ologists" involved if the highest level of service is to be offered. Finally, we hope this explicit coverage of roles and practices serves to highlight the many benefits that coaches can receive by working in tandem with sport psychologists (therefore creating opportunities for future working relationships) and responds to calls from the applied field to reduce the disparity between theory- and practice-driven research, provide a more complete conceptualization of applied practice in all its complexity, and emphasize the

need for professional judgment when attempting to employ the current evidence base (Winter & Collins, 2015).

REFERENCES

Abraham, A., & Collins, D. (2011). Taking the next step: Ways forward for coaching science. *Quest*, *63*, 366–384. doi:10.1080/00336297.2011.10483687

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*, 179–211. doi:10.1016/0749-5978(91)90020-T

Andersson, A. (2009, 23 April). Michael Phelps changes technique in bid for perfect stroke. *The Telegraph*. Retrieved from http://www.telegraph.co.uk

Bar-Eli, M. (1991). On the use of paradoxical interventions in counseling and coaching in sport. *The Sport Psychologist*, *5*, 61–72.

BBC. (2007, 8 May). *Lessions I have learned: Steve Backley*. Retrieved from http://news.bbc.co.uk/sport1/hi/athletics/skills/6615335.stm

Beauchamp, M. K., Harvey, R. H., & Beauchamp, P. H. (2012). An integrated biofeedback and psychological skills training program for Canada's Olympic short-track speedskating team. *Journal of Clinical Sport Psychology*, *6*, 67–84.

Becker, A. J. (2009). It's not what they do, it's how they do it: Athlete experiences of great coaching. *International Journal of Sports Science and Coaching*, *4*, 93–119. doi:10.1260/1747-9541.4.1.93

Bortoli, L., Bertollo, M., Hanin, Y., & Robazza, C. (2012). Striving for excellence: A multi-action plan intervention model for shooters. *Psychology of Sport and Exercise*, *13*, 693–701. doi:10.1016/j.psychsport.2012.04.006

Burke, V. (2011). Organizing for excellence. In D. Collins, A. Button, & H. Richards (Eds.), *Performance psychology: A practitioner's guide* (pp. 99–119). Oxford: Elsevier.

Butler, R. J., & Hardy, L. (1992). The performance profile: Theory and application. *The Sport Psychologist*, *6*, 253–264.

Cannon-Bowers, J. A., Salas, E., & Converse, S. A. (1993). Shared mental models in expert team decision making. In N. J. Castellan (Ed.), *Individual and group decision making* (pp. 221–246). Hillsdale, NJ: Lawrence Erlbaum Associates.

Carson, H. J. (2014). *Working inside the black box: Refinement of pre-existing skills*. (Doctoral thesis), University of Central Lancashire, Preston, England. Retrieved from http://clok.uclan.ac.uk/9602/

Carson, H. J., & Collins, D. (2011). Refining and regaining skills in fixation/diversification stage performers: The Five-A Model. *International Review of Sport and Exercise Psychology*, *4*, 146–167. doi:10.1080/1750984x.2011.613682

Carson, H. J., & Collins, D. (2014). Effective skill refinement: Focusing on process to ensure outcome. *Central European Journal of Sport Sciences and Medicine*, *7*, 5–21.

Carson, H. J., & Collins, D. (2015). Tracking technical refinement in elite performers: The good, the better, and the ugly. *International Journal of Golf Science*, *4*, 67–87. doi:10.1123/ijgs.2015-0003

Carson, H. J., & Collins, D. (2016). The fourth dimension: A motoric perspective on the anxiety–performance relationship. *International Review of Sport and Exercise Psychology*, *9*, 1–21. doi:10.1080/1750984X.2015.1072231

Carson, H. J., Collins, D., & Jones, B. (2014). A case study of technical change and rehabilitation: Intervention design and interdisciplinary team interaction. *International Journal of Sport Psychology*, *45*, 57–78. doi:10.7352/IJSP2014.45.057

Carson, H. J., Collins, D., & Kearney, P. (in press). Skill change in elite-level kickers: Interdisciplinary considerations of an applied framework. In H. Hiroyuki, E. Hennig, & N. Smith (Eds.), *Football biomechanics*. New York, NY: Routledge.

Carson, H. J., Collins, D., & MacNamara, Á. (2013). Systems for technical refinement in experienced performers: The case from expert-level golf. *International Journal of Golf Science*, *2*, 65–85.

Carson, H. J., Collins, D., & Richards, J. (2014a). Intra-individual movement variability during skill transitions: A useful marker? *European Journal of Sport Science*, *14*, 327–336. doi:10.1080/17461391.2013.814714

Carson, H. J., Collins, D., & Richards, J. (2014b). "To hit, or not to hit?" Examining the similarity between practice and real swings in golf. *International Journal of Golf Science*, *3*, 103–118. doi:10.1123/ijgs.2014-0003

Carson, H. J., Collins, D., & Richards, J. (2016). Initiating technical refinements in high-level golfers: Evidence for contradictory procedures. *European Journal of Sport Science*, *16,* 473–482. doi:10.1080/17461391.2015.1092586

Christina, R. W., & Corcos, D. M. (1988). *Coaches guide to teaching sport skills*. Champaign, IL: Human Kinetics.

Collins, D. (2011). Practical dimensions of realizing your peak performance. In D. Collins, A. Button, & H. Richards (Eds.), *Performance psychology: A practitioner's guide* (pp. 381–391). Oxford, UK: Elsevier.

Collins, D., Abraham, A., & Collins, R. (2012). On vampires and wolves—Exposing and exploring reasons for the differential impact of coach education. *International Journal of Sport Psychology*, *43*, 255–272.

Collins, D., Burke, V., Martindale, A., & Cruickshank, A. (2015). The illusion of competency versus the desirability of expertise: Seeking a common standard for support professions in sport. *Sports Medicine*, *45*, 1–7. doi:10.1007/s40279-014-0251-1

Collins, D., Carson, H. J., & Cruickshank, A. (2015). Blaming Bill Gates AGAIN! Misuse, overuse and misunderstanding of performance data in sport. *Sport, Education and Society*, *20*, 1088–1099. doi:10.1080/13573322.2015.1053803

Collins, D., Doherty, M., & Talbot, S. (1993). Performance enhancement in motocross: A case study of the sport science team in action. *The Sport Psychologist*, *7*, 290–297.

Collins, D., Jones, B., Fairweather, M., Doolan, S., & Priestley, N. (2001). Examining anxiety associated changes in movement patterns. *International Journal of Sport Psychology*, *32*, 223–242.

Collins, D., Morriss, C., & Trower, J. (1999). Getting it back: A case study of skill recovery in an elite athlete. *The Sport Psychologist*, *13*, 288–298.

Cresswell, S. L., & Eklund, R. C. (2006). The nature of player burnout in rugby: Key characteristics and attributions. *Journal of Applied Sport Psychology*, *18*, 219–239. doi:10.1080/10413200600830299

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper & Row.

DailyMail. (2015, July 29). *Gary Ballance: I won't change my technique because I got axed by England. . . people were praising me when I played well*. Retrieved from http://www.dailymail.co.uk

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.

Gentile, A. M. (1972). A working model of skill acquisition with application to teaching. *Quest*, *17*, 3–23. doi:10.1080/00336297.1972.10519717

Giblin, G., Farrow, D., Reid, M., Ball, K., & Abernethy, B. (2015). Exploring the kinaesthetic sensitivity of skilled performers for implementing movement instructions. *Human Movement Science*, *41*, 76–91. doi:10.1016/j.humov.2015.02.006

Giges, B., Petitpas, A. J., & Vernaccia, R. A. (2004). Helping coaches meet their own needs: Challenges for the sport psychology consultant. *The Sport Psychologist*, *18*, 430–444.

Hamilton, L. (2015, September 11). Senna—The genuine hero. Retrieved from http://www.grandprix247.com/2015/09/11/hamilton-ayrton-senna-the-genuine-hero/

Hanin, Y., Korjus, T., Jouste, P., & Baxter, P. (2002). Rapid technique correction using old way/new way: Two case studies with Olympic athletes. *The Sport Psychologist*, *16*, 79–99.

Hanin, Y., Malvela, M., & Hanina, M. (2004). Rapid correction of start technique in an Olympic-level swimmer: A case study using old way/new way. *Journal of Swimming Research*, *16*, 11–17.

Harwood, C., & Steptoe, K. (2013). The integration of single case designs in coaching contexts: A commentary for applied sport psychologists [Special issue]. *Journal of Applied Sport Psychology*, *25*, 167–174. doi:10.1080/10413200.2012.690361

Hays, K., Maynard, I., Thomas, O., & Bawden, M. (2007). Sources and types of confidence identified by world class sport performers. *Journal of Applied Sport Psychology*, *19*, 434–456. doi:10.1080/10413200701599173

Hodge, K., & Smith, W. (2014). Public expectation, pressure, and avoiding the choke: A case study from elite sport. *The Sport Psychologist*, *28*, 375–389. doi:10.1123/tsp.2014-0005

Holmes, P. S., & Calmals, C. (2011). Mental practice: Neuroscientific support for a new approach. In D. Collins, A. Button, & H. Richards (Eds.), *Performance psychology: A practitioner's guide* (pp. 231–244). Oxford: Elsevier.

Holmes, P. S., & Collins, D. J. (2001). The PETTLEP approach to motor imagery: A functional equivalence model for sport psychologists. *Journal of Applied Sport Psychology*, *13*, 60–83. doi:10.1080/10413200109339004

Jackson, R. C., & Baker, J. S. (2001). Routines, rituals, and rugby: Case study of a world class goal kicker. *The Sport Psychologist*, *15*, 48–65.

James, B., & Collins, D. (1997). Self-presentational sources of competitive stress during performance. *Journal of Sport and Exercise Psychology*, *19*, 17–35.

Lang, P. J., Kozak, M. J., Miller, G. A., Levin, D. N., & McLean Jr, A. (1980). Emotional imagery: Conceptual structure and pattern of somato-visceral response. *Psychophysiology*, *17*, 179–192. doi:10.1111/j.1469-8986.1980.tb00133.x

Leary, M. R. (1995). *Self-presentation: Impression management and interpersonal behavior*. Dubuque, IA: Brown & Benchmark.

Lynch, G. P. (1988). Athletic injuries and the practicing sport psychologist: Practical guidelines for assisting athletes. *The Sport Psychologist*, *2*, 161–167.

MacPherson, A. C., Collins, D., & Morriss, C. (2008). Is what you think what you get? Optimizing mental focus for technical performance. *The Sport Psychologist*, *22*, 288–303.

MacPherson, A. C., Collins, D., & Obhi, S. S. (2009). The importance of temporal structure and rhythm for the optimum performance of motor skills: A new focus for practitioners of sport psychology. *Journal of Applied Sport Psychology*, *21*, 48–61. doi:10.1080/10413200802595930

Martindale, A., & Collins, D. (2005). Professional judgment and decision making: The role of intention for impact. *The Sport Psychologist*, *19*, 303–317.

Martindale, A., & Collins, D. (2012). A professional judgment and decision making case study: Reflection-in-action research [Special issue]. *The Sport Psychologist*, *26*, 500–518.

Martindale, A., & Collins, D. (2013). The development of professional judgment and decision making expertise in applied sport psychology. *The Sport Psychologist*, *27*, 390–399.

Mendoza, L., & Schöllhorn, W. (1993). Training of the sprint start technique with biomechanical feedback. *Journal of Sports Sciences*, *11*, 25–29. doi:10.1080/02640419308729959

Moore, W. E., & Stevenson, J. R. (1991). Understanding trust in the performance of complex automatic sport skills. *The Sport Psychologist*, *5*, 281–289.

Mullen, R., & Hardy, L. (2010). Conscious processing and the process goal paradox. *Journal of Sport & Exercise Psychology*, *32*, 275–297.

Müller, E., & Schwameder, H. (2003). Biomechanical aspects of new techniques in alpine skiing and ski-jumping. *Journal of Sports Sciences*, *21*, 679–692. doi:10.1080/0264041031000140284

Newman, P. (2015, January 9). Andy Murray reveals he is seeing sports psychologist after change of heart. *The Independent*. Retrieved from www.independent.co.uk

Nieuwenhuys, A., & Oudejans, R. R. D. (2012). Anxiety and perceptual-motor performance: Toward an integrated model of concepts, mechanisms, and processes. *Psychological Research*, *76*, 747–759. doi:10.1007/s00426-011-0384-x

Paivio, A. (1986). *Mental representations: A dual-coding approach*. New York, NY: Oxford University Press.

Palmer, B. (2009, May 20). *Why is Michael Phelps tinkering with success?*. Retrieved from http://www.slate.com/articles/sports/sports_nut/2009/05/why_is_michael_phelps_tinkering_with_success.html

Penn, M. J., & Spratford, W. (2011). Are current coaching recommendations for cricket batting technique supported by biomechanical research? *Sports Biomechanics*, *11*, 311–323. doi:10.1080/14763141.2011.638387

Polkinghorne, D. (2015, August 22). *AIS helping give Canberra javelin thrower Kelsey-Lee Roberts a secret weapon for Rio Olympics*. Retrieved from http://www.smh.com.au/sport/athletics/ais-helping-give-canberra-javelin-thrower-kelseylee-roberts-a-secret-weapon-for-rio-olympics-20150821-gj4ef3.html

Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology*, *51*, 390–395. doi:10.1037/0022-006x.51.3.390

Prochaska, J. O., & DiClemente, C. C. (1992). Stages of change in the modification of problem behaviors. In M. Hersen, R. M. Eisler, & P. M. Miller (Eds.), *Progress in behavior modification* (pp. 184–214). Sycamore, IL: Sycamore Press.

Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change: Applications to addictive behaviors. *American Psychologist*, *47*, 1102–1114. doi:10.1037/0003-066x.47.9.1102

Prochaska, J. O., & Prochaska, J. M. (1999). Why don't continents move? Why don't people change? *Journal of Psychotherapy Integration*, *9*, 83–102. doi:10.1023/A:1023210911909

Prochaska, J. O., Velicer, W. F., Guadagnoli, E., Rossi, J. S., & DiClemente, C. C. (1991). Patterns of change: Dynamic typology applied to smoking cessation. *Multivariate Behavioral Research*, *26*, 83–107. doi:10.1207/s15327906mbr2601_5

Ranson, C., King, M., Burnett, A., Worthington, P., & Shine, K. (2009). The effect of coaching intervention on elite fast bowling technique over a two year period. *Sports Biomechanics*, *8*, 261–274. doi:10.1080/14763140903469908

Ravizza, K. (1988). Gaining entry with athletic personnel for season long consulting. *The Sport Psychologist*, *4*, 330–340.

Rendell, M. A., Farrow, D., Masters, R., & Plummer, N. (2011). Implicit practice for technique adaptation in expert performers. *International Journal of Sports Science and Coaching*, *6*, 553–566. doi:10.1260/1747-9541.6.4.553

Renshaw, I., Davids, K. W., Shuttleworth, R., & Chow, J. Y. (2009). Insights from ecological psychology and dynamical systems theory can underpin a philosophy of coaching. *International Journal of Sport Psychology*, *40*, 540–602.

Richards, H. (2011). Coping and mental toughness. In D. Collins, A. Button, & H. Richards (Eds.), *Performance psychology: A practitioners' guide* (pp. 281–300). Oxford: Elsevier.

Richards, P., Collins, D., & Mascarenhas, D. R. D. (2012). Developing rapid high-pressure team decision-making skills. The integration of slow deliberate reflective learning within the competitive performance environment: A case study of elite netball. *Reflective Practice*, *13*, 407–424. doi:10.1080/14623943.2012.670111

Richards, P., Mascarenhas, D. R. D., & Collins, D. (2009). Implementing reflective practice approaches with elite team athletes: Parameters of success. *Reflective Practice*, *10*, 353–363. doi:10.1080/14623940903034721

Rushall, B. S. (1979). *Psyching in sports*. London: Pelham Books.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*, 68–78. doi:10.1037/0003-066X.55.1.68

Schack, T., & Bar-Eli, M. (2007). Psychological factors of technical preparation. In B. Blumenstein, R. Lidor, & G. Tenenbaum (Eds.), *Psychology of sport training* (pp. 62–103). Münster, Germany: Meyer & Meyer Sport.

Seabourne, T. G., Weinberg, R. S., Jackson, A. W., & Suinn, R. M. (1985). Sport psychology effect of individualized, nonidividualized, and package intervention strategies on karate performance. *The Sport Psychologist*, *7*, 40–50.

Stoszkowski, J., & Collins, D. (2016). Sources, topics and use of knowledge by coaches. *Journal of Sports Sciences*, *34,* 794–802. doi:10.1080/02640414.2015.1072279

Swann, C., Crust, L., Keegan, R., Piggott, D., & Hemmings, B. (2015). An inductive exploration into the flow experiences of European Tour golfers. *Qualitative Research in Sport, Exercise and Health*, *7*, 210–234. doi:10.1080/2159676X.2014.926969

Verdi, B. (2012, May 10). *Perks finds the game's darkest place, then walks away*. Retrieved from http://sports.yahoo.com/news/verdi-column-perks-finds-games-192429182–golf.html

Wanlin, C. M., Hrycaiko, D. W., Martin, G. L., & Mahon, M. (1997). The effects of a goal-setting package on the performance of speed skaters. *Journal of Applied Sport Psychology*, *9*, 212–228. doi:10.1080/10413209708406483

Weaver, P. (2014, May 9). Lewis Hamilton goes into reverse over Mercedes psychologist in F1. *The Guardian*. Retrieved from http://www.theguardian.com/

Weston, N., Greenlees, I., & Thelwell, R. (2013). A review of Butler and Hardy's (1992) performance profiling procedure within sport. *International Review of Sport and Exercise Psychology*, *6*, 1–21. doi:10.1080/1750984X.2012.674543

Williams, S. E., Cooley, S. J., & Cumming, J. (2013). Layered stimulus response training improves motor imagery ability and movement execution. *Journal of Sport and Exercise Psychology*, *35*, 60–71.

Winter, S., & Collins, D. (2015). Why do we do, what we do?. *Journal of Applied Sport Psychology*, *27*, 35–51. doi:10.1080/10413200.2014.941511

Winter, S., MacPherson, A. C., & Collins, D. (2014). "To think, or not to think, that is the question". *Sport, Exercise, and Performance Psychology*, *3*, 102–115. doi:10.1037/spy0000007

Wulf, G. (2013). Attentional focus and motor learning: A review of 15 years. *International Review of Sport and Exercise Psychology*, *6*, 77–104. doi:10.1080/1750984x.2012.723728